



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

November 19, 2020

AIRFRAME AND ENGINE EXAMINATION

WPR20LA180

This document contains 18 embedded photos.

A. ACCIDENT

Location:	Renton, Washington
Date:	June 12, 2020
Aircraft:	Bellanca 7KCAB, N36339
NTSB Investigator-in-Charge:	Zoe Keliher

B. PARTICIPANTS

Joshua Cawthra
Senior Aviation Accident Investigator
National Transportation Safety Board
Federal Way, Washington

Eric M. Gutierrez
Air Safety Investigator
National Transportation Safety Board
Federal Way, Washington

C. SUMMARY

The examination of the recovered airframe and engine revealed a blockage of the alternate air intake induction airbox by a wax like paper. Further examination of the airframe and engine revealed no additional evidence of any mechanical anomalies that would have precluded normal operation.

D. DETAILS OF THE INVESTIGATION

1.0 Aircraft Examination

Examination of the recovered wreckage revealed that the left main landing gear was separated from the airframe. The right-wing fuel line was crimped closed near the wing root by recovery personnel to stop a fuel leak. Additionally, a portion of the left wingtip was removed by recovery personnel due to impact damage.



Figure 1. View of airplane during examination

The left and right wings remained attached to the airframe and exhibited buckling of the fabric throughout. Visual inspection of the left and right fuel caps revealed that both fuel caps rubber seals appeared worn. The observed tachometer time was 5,961.1 hours and the HOBBS meter indicated 6,893.7 hours



Figure 2. View of left fuel cap



Figure 3. View of right fuel cap



Figure 4. View of left-wing



Figure 5. View of right-wing

During removal of the lower section of the engine cowling, a wax like paper was observed in the inlet cavity of the alternate air induction box. The paper appeared to have mostly restricted inlet cavity. When removed and laid out, the paper measured about 3 ft x 2 ft.

The rubber boot from the air intake box on the lower engine cowling had two breeze clamps in place, however, the aft clamp was located about mid depth on the rub. Additionally, the lower cowling exhibited impact damage to the lower right side.

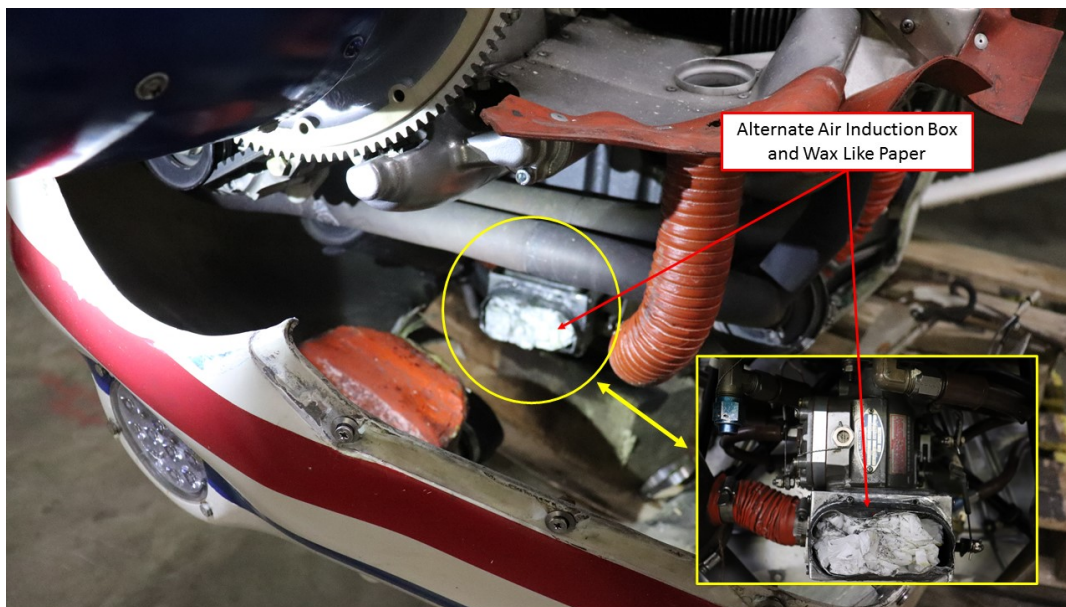


Figure 6. View of wax like paper in the alternate air induction box



Figure 7. View of lower engine cowling and induction airbox



Figure 8. View of wax like paper laid out

Throttle and mixture control continuity was established from the cockpit controls to the fuel servo and moved from stop to stop when actuated by hand.

A visual inspection was conducted the fuel system. Continuity was established from the main fuel tanks throughout the system to the fuel injector nozzles. The fuel lines from the fuel flow

divider were disconnected from the fuel nozzles, and the airframe electric fuel pump was turned on. Fuel expelled from all four fuel injector lines when the electric fuel pump was operated. The fuel was tested for water using SAR-GEL water finding paste, with negative results.



Figure 9. View of fuel from fuel injector from cylinders 1 & 3



Figure 10. View of fuel from fuel injector from cylinders 2 & 4

The gascolator was intact and undamaged. The gascolator bowl was removed and visually inspected. The bowl contained a blue liquid consistent with 100 Low Lead fuel and was free of debris. The gascolator screen was free of debris.

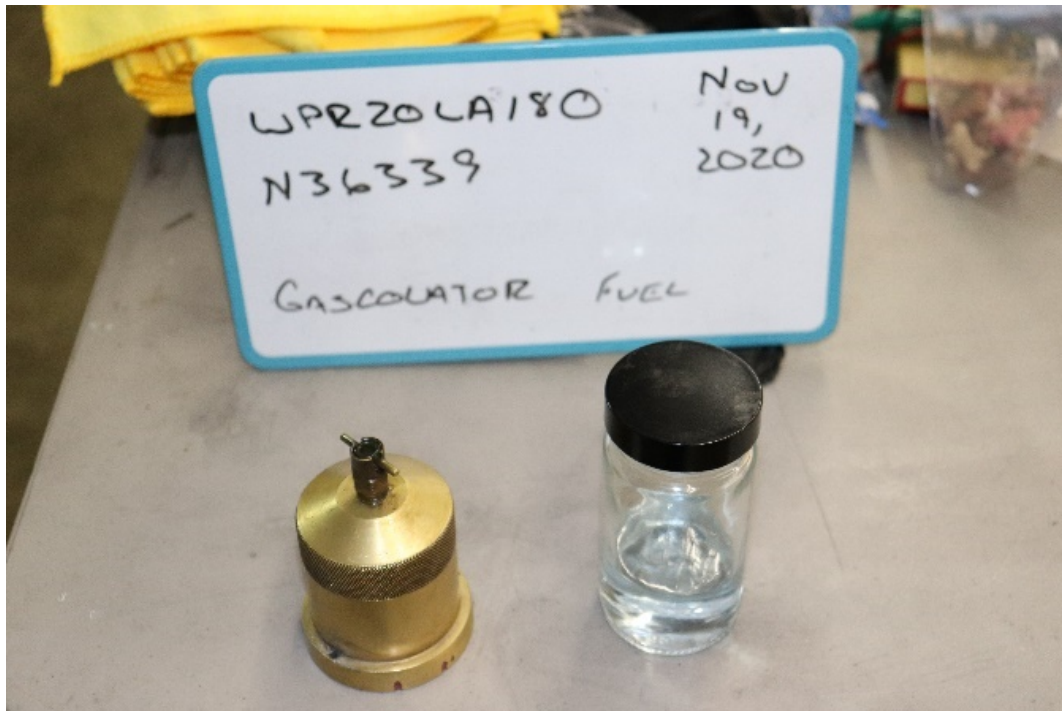


Figure 11. View of gascolator bowl and recovered fuel

2.0 Engine Examination

Engine Manufacturer: Lycoming
Engine Model Number: IO-320-L2A
Engine Serial Number: L-5037-55A

Examination of the recovered engine revealed that it remained attached to the engine mounts. All four cylinders and all engine accessories remained attached. All fuel and oil lines appeared attached to their respective fittings and were tight. No evidence of any mechanical damage was observed to the engine crankcase. The oil sump exhibited impact damage on the lower right side, in an area consistent with the impact damage observed on the lower cowling. Additional impact damage was observed to the upper area of the number two cylinder rocker box cover.



Figure 13. Overview of the engine



Figure 14. View of damage to the oil sump

The rocker box covers were removed. The intake and exhaust rocker arms were intact and oil coated on all cylinders. All intake and exhaust valve springs were in place and visually appeared to be undamaged. The upper spark plugs were removed, and all four cylinders were examined internally using a lighted borescope. A normal amount of combustion deposits was observed within the combustion dome of each cylinder and piston face. All of the intake and exhaust

valves were unremarkable. The crankshaft was rotated by hand using the propeller. Rotational continuity was established throughout the engine and valve train. Thumb compression and suction was obtained on all four cylinders.



Figure 15. View of number 2 & 4 cylinders rocker arms

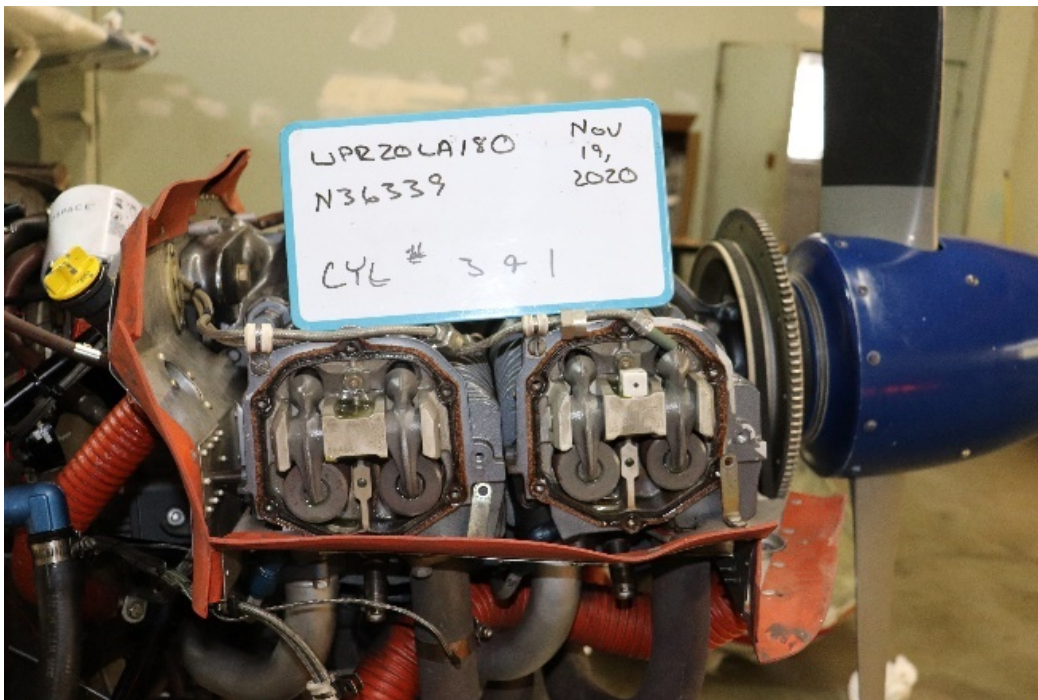


Figure 16. View of number 3 & 1 cylinders rocker arms.

The top and bottom spark plugs were removed from the engine and they were the massive electrode type. When compared to the Champion Check-A-Plug chart, the sparkplugs had the following signatures:

<u>Cylinder Number:</u>	<u>Upper Spark Plugs</u>	<u>Lower Spark Plugs</u>
<u>1</u>	WORN OUT-SEVERE	WORN OUT-NORMAL
<u>2</u>	WORN OUT-NORMAL	WORN OUT-NORMAL
<u>3</u>	WORN OUT-NORMAL	WORN OUT-NORMAL
<u>4</u>	WORN OUT-NORMAL	WORN OUT-NORMAL

Except for cylinder number 4 bottom spark plug, all spark plugs had black deposits within the electrode area. The bottom spark plug for cylinder number 4 was oil soaked.



Figure 17. Upper and lower spark plugs

The left and right magnetos remained attached to the engine accessory case with no external damage noted. Engine to magneto timing was verified at 25°. When the engine crankshaft was rotated by hand using the propeller, spark was produced on four ignition leads from the left magneto and impulse coupling engagement was heard. The right magneto, which was not equipped with an impulse coupling, was removed. When the magneto drive shaft was rotated by hand, spark was produced on four ignition posts.

The engine driven fuel pump was tested by rotating the crankshaft by hand using the propeller. Liquid expelled from the fuel flow divider inlet fuel line and was found to be consistent with 100 low lead fuel and was free of debris.

The fuel flow divider was intact and undamaged. The fuel flow divider was removed and disassembled. The spring and diaphragm were intact and undamaged.

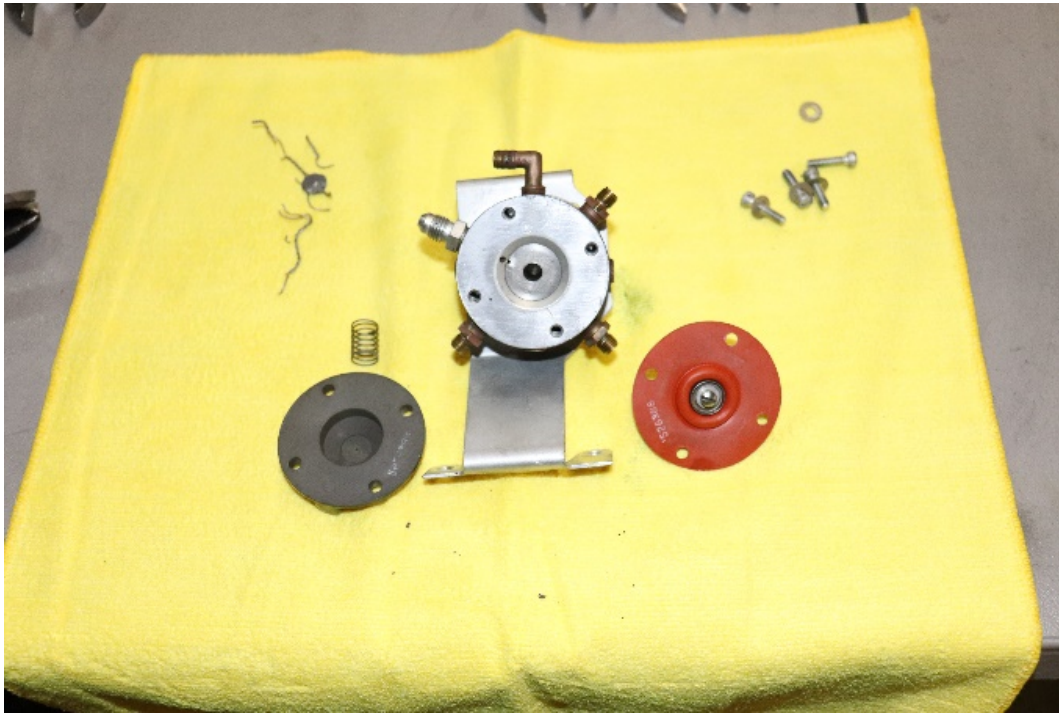


Figure 12. Overview of disassembled fuel divider

All four fuel injector nozzles were removed from the cylinders and found to be free of debris or restrictions.

The fuel servo was intact and undamaged. The fuel servo inlet fuel screen was free of debris. The throttle valve and throttle lever were intact and undamaged. The fuel servo was removed and disassembled. the air and fuel diaphragms were intact, and undamaged. The mixture shaft was removed and found unremarkable.



Figure 18. Overview of disassembled fuel servo

The exhaust system remained secure to the cylinders. No evidence of any exhaust leaks around the cylinder attach points were observed. The left and right shrouds were removed, no cracks or evidence of exhaust leaks were noted. The left and right exhaust system was examined internally using a lighted borescope and the internal baffles were intact.

Submitted by: Joshua Cawthra